

1.

$$\int_0^1 \sqrt{x} (x+1) dx$$

$$\int_0^1 x^{3/2} + x^{1/2} dx$$

Mar 30-7:29 AM

3.

$$f(x) = 3x^5 - 4x^3 - 3x$$

$$\text{rel max} \quad f'(x) = 15x^4 - 12x^2 - 3 = 0$$

$$3(5x^4 - 4x^2 - 1) = 0$$

$$3(5x^2 + 1)(x^2 - 1) = 0$$

$$x = \pm 1 \quad \text{JAM}$$

$$f'' = 60x^3 - 24x$$

$$f''(1) > 0 \quad \text{⊕}^+$$

$$f''(-1) < 0 \quad \text{⊖}^-$$

$$\text{rel max at } x = -1$$

Mar 30-8:03 AM

$$11. \int_1^{\infty} \frac{x}{(1+x^2)^2} dx = \lim_{b \rightarrow \infty} \int_1^b \frac{x}{(1+x^2)^2} dx$$

$$\begin{aligned} u &= 1+x^2 \\ \frac{du}{dx} &= 2x \\ du &= 2x dx \\ dx &= \frac{du}{2x} \end{aligned} \quad \begin{aligned} \int \frac{x}{u^2} \frac{du}{2x} &= \frac{1}{2} \int \frac{du}{u^2} \\ \frac{1}{2} \int u^{-2} du &= \frac{1}{2} \cdot \frac{u^{-1}}{-1} = -\frac{1}{2u} \\ \lim_{b \rightarrow \infty} \left( -\frac{1}{2(1+x^2)} \right) \Big|_1^b \end{aligned}$$

$$\lim_{b \rightarrow \infty} \left( -\frac{1}{2(1+b^2)} - \left( -\frac{1}{2(1+1^2)} \right) \right) = \frac{1}{4}$$

Mar 30-8:10 AM

$$10. \quad y = xy + x^2 + 1 \quad x = -1$$

$$\frac{dy}{dx} = ?$$

$$\frac{dy}{dx} = x \frac{dy}{dx} + y \cdot 1 + 2x$$

$$\frac{dy}{dx} - x \frac{dy}{dx} = y + 2x$$

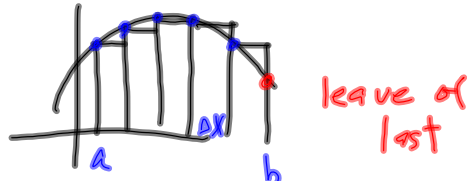
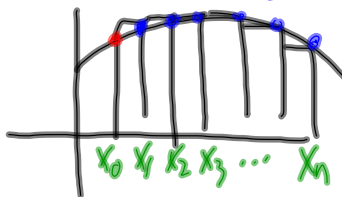
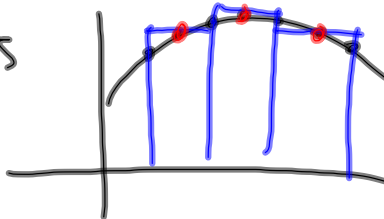
$$\frac{dy}{dx} (1-x) = y + 2x$$

$$\frac{dy}{dx} = \frac{y+2x}{1-x} \Big|_{x=-1} = \frac{1-2}{1+1} = -\frac{1}{2}$$

$$x = -y + 2 \quad y = 1$$

Mar 30-8:15 AM

Review 17

Riemann Sums, Accumulation  
functionsLeft (LRAM)  
 $(y_0 + y_1 + y_2 + \dots + y_{n-1}) \Delta x$ Right (RRAM)  
 $(y_1 + y_2 + \dots + y_n) \Delta x$ Mid (mRAM)  
use "middle" dots  
rectangles are  
twice as wide

Mar 30-8:21 AM

P174 # 2 vel. of remote controlled  
car

a) LRAM

$$(0 + 6 + 10 + \dots + 4) \cdot 1 = 114$$

b) RRAM

$$(6 + 10 + 16 + \dots + 2) \cdot 1 = 116$$

c) mRAM

$$(6 + 16 + 12 + 22 + 4) \cdot 2 = 120$$

Mar 30-8:32 AM

$$\int_a^b \text{rate } dt = \text{net change}$$

ex.  $\int_a^b v(t) dt = \text{displacement}$

Mar 30-8:38 AM

Apple orchard.

$$P(t) = 1.3 + 1.025^t$$

$t = \# \text{ yrs since}$   
beg. of 1980

thousands of Bu  
yr

Total # bushels from  
beg of 1980 to beg of 2004

k Bu  
yr

$$\int_0^{24} 1.3 + 1.025^t dt = 63.9517 \text{ kBu}$$

63,952 Bu

Mar 30-8:40 AM